

## **WDIY Interview (NPR Affiliate), February 13, 2012.**

### **Host:**

Good Evening Everyone. It's time to take charge of your life. Hello, this is marriage and family therapist, Eleanor Bobrow, your host, inviting you to take charge of your life on WDIY. The theme of this program is that so many events in life happen to us over which we have no control. Our only control is our response to life's situation. It is often said that 90% of life's events happen to us and 10% is what we make happen.

This evening we talk about Demystifying Algebra. We in the Lehigh Valley are fortunate to have an Allentown based company, Borenson and Associates, a parent company of Hands-On Equations® who recently trained about 20 teachers in Nazareth in a six hour workshop called Making Algebra Child's Play®. Now I don't know about you, but I would have loved to have had a workshop like that in school. And particularly I would have had to have teachers trained in that method when I was growing up. Now since 1990 the workshop has been taught to more than 50,000 educators nationally and about 50 districts Pennsylvania wide have been using this concept in one or more classrooms, according to my guest this evening. My guests this evening are Dr. Henry Borenson a former Pennsylvania Math Teacher and Coordinator who designed the program and is currently President of Borenson and Associates. Also with me to discuss this concept of "Making Algebra Child's Play" is Media Relations Director, Heather Harter, and we will also be taking with Dale Beltzner from Southern Lehigh Intermediate School, and he is a Sixth Grade Math Leader, and we will also talk with Kathryn Dillard, a Certified Instructor who is nationally certified in Making Algebra Child's Play®. It is a pleasure to welcome Dr. Henry Borenson who is currently in Israel. Welcome to Take Charge of Your Life. Dr. Henry Borenson.

### **Dr. Borenson**

Well thank you, it is a pleasure for me to be here and participate in this interview.

### **Host**

Dr. Borenson, tell us how did you start and come up with the idea of Making Algebra Child's Play®?

### **Dr. Borenson**

Well, I knew from teaching 7<sup>th</sup> Grade Mathematics that Algebra was a very difficult subject for students. It is very abstract. Many students who had succeeded with Mathematics in prior years, once they got to Algebra, all of a sudden they floundered. And so, I was experimenting with an approach to make it more visual. And one day in my 7<sup>th</sup> grade classroom, I showed a certain tactorial method, which actually has not been incorporated into the program, and one of the weakest students in that 7<sup>th</sup> grade class was able to solve the algebraic equations quicker than the top student. So that led me to the idea that there's something here that needed looking into. So at that point I began a research project which lasted about two years. It took two years to develop the 25 lessons that make up the program. But during those 2 years I worked with students with learning disabilities, and the program evolved in working with them. In other words, I

would ask them, “What would you do at this point?” and “How would you check your answer?” That’s how the program came about. I believe that’s why it’s so successful. It didn’t come from me. It came from the students in my interviewing them and working with them.

### **Host**

And what did you find was most successful, because I’m interested in working with children with learning disabilities and children who have problems. Now I don’t know if I had a learning disability, but I certainly couldn’t get math. I couldn’t get algebra. And I will just say that I grew up in New York State, and we had to have a regent. I had a young man in my class who was very good in math tutor me in intermediate math so that I could get good grades on the required New York State Regents. He was more excited, Dr. Borenson. He was more excited about my 75 than he was about his 99. So tell us, what material did you find that was successful in creating that ability to get it?

### **Dr. Borenson**

I assume the first breakthrough occurred when I was working with a friend of mine out in Poughkeepsie, and he had a 4<sup>th</sup> grade daughter. I was using some little magnets to try to illustrate an equation. She was solving an equation that’s normally presented in the 9<sup>th</sup> grade. I asked the father if she was a gifted child. He said, “No, she was average.” So that further confirmed that there was something very significant happening here. As you mentioned, learning disabled students very often need something that is visual, something they can touch. So what we do is, we take what for most people, most students are considered abstract concepts. In other words, if you have an equation  $4x + 3 = 3x + 9$ ; that really looks like Chinese symbols. There’s no way to understand what that means. So when students are taught to memorize procedures or rules for solving the equation, well if you’re not too good at memorizing, it’s a difficult process. Also it is meaningless. So what I have done with this system is enabled the students to visualize that problem, we demystify the equation by using game pieces. We use pieces that look like chess pieces for the teacher. The student uses game markers and numbered cubes to represent an equation. Do you think I can give you an example so that you can see the idea?

### **Host**

Absolutely, I am very interested!

### **Dr. Borenson**

So let’s say you have an example such as  $4x + 3 = 3x + 9$ . Most students in the United States would not experience that equation until the 8<sup>th</sup> or the 9<sup>th</sup> grade. With Hands-On Equations® students can learn it as early as the 3<sup>rd</sup> grade. What they would do is this. When they see the  $4x$ , they recognize the  $x$  as a marker, as a blue pawn. So when it says  $4x$ , they read it as 4  $x$ ’s and they simply set up 4 blue markers on the left side of what looks like a balance scale. It’s just a picture of a scale, a laminated scale. When it says plus they understand the plus is a physical action of placing unto the scale. So if the equation is  $4x + 3$  they would place a cube with the number 3 facing upward, and on the right side it says 3  $x$ ’s plus 9. They would place 3 blue pawns and,  $4x + 3 = 3x + 9$ , they would place 3 blue pawns and then they would place a cube with the number 9. Now

these pieces already have meaning for the student. These are weights on a scale. The challenge is to find the value of the weight that makes it balanced. So the students can try doing it by trial and error. But after while, as a matter of fact in the third lesson the students learn that if they physically remove a pawn from each side that they are maintaining the balance. This is not a rule they are taught. You ask them and they will tell you that the balance is maintained. So what they are now doing is doing legal moves. They are actually doing the same thing a 9<sup>th</sup> grade student would be doing on the blackboard, but they are doing it physically. After you do that 3 times, you remove 3 pawns from each side, and if you are able to visualize this, you are now left with a blue pawn on the left, a cube with the number 3 on the left, and on the right all you are left with is a 9 cube. The blue pawns on each side have disappeared. So once you have a blue pawn and a 3 worth 9, then the student sees that  $x$  is worth 6.

**Host**

Now Dr. Borenson, what I'm hearing is this they actually use a scale that tilts. Is that correct? Are they using a...

**Dr. Borenson**

No, actually we do not want a scale to tilt because we don't want a child to take a scale with them for the rest of their lives. It is only an image of the scale.

**Host**

I see.

**Dr. Borenson**

So how do they know their answer is correct? The way they know they're correct or not, is they reset the problem and evaluate both sides of the equation. In this example that we just did, if the pawn is 6 and you put it back on the scale. Four sixes are 24 and 3 is 27. Three sixes on the right side is 18 and 9 is 27. So we are trying to get the student to develop a sense of mathematical power by doing the check on their own rather than relying on a tilting scale.

**Host**

Now if you've just tuned in you're listening, not to a math program, but you are listening to Take Charge of Your Life on WDIY. My guests this evening are Dr. Borenson, who is the President of Borenson and Associates, and he's talking about a very concrete program that he has developed which enables children from grades 3 on up to get a better handle on Algebra, and it's called Making Algebra Child's Play®. He's just given us an example of how children learn. Now let me turn to Heather. Now Heather, you are a, are you a math person Heather?

**Heather**

I did well in math in school, but it is not necessarily my strong point.

**Host**

Aha. Have you found it; has this method been a revelation to you?

**Heather**

Oh it has. When I started with the company I went through the 26 lessons as part of my first couple of weeks. And then I also discovered that my 6<sup>th</sup> grade daughter had the same program in her school. I could see the relevance of how she was learning these concepts at a much earlier age than I did when I was in school.

**Host**

Did you ever have an opportunity to go into the class and see how this was being conducted? Or have an ability to attend a session, the workshop?

**Heather**

I have attended the session in Nazareth where I got to meet a lot of the teachers there. I got to meet the Curriculum Director and understand their reasoning for implementing Hands-On Equations in their classroom and what they hope to gain from it, especially at an earlier age. They are starting at an intermediate school which is the 4<sup>th</sup> grade.

**Host**

Now you recently had a workshop at Nazareth. What was the response amongst the teachers?

**Heather**

The teachers were very excited. They were pleased to see that they could bring these concepts in at such an earlier grade level than they had in the past. And by introducing the concepts as early as 4<sup>th</sup> grade and completing the Hands-On Equations® program by 6<sup>th</sup> grade, it positions the student for much greater advancement in math and success later on in higher levels of mathematics.

**Host**

Now you had an incident with your daughter where she invited you into a math class. Tell us about that.

**Heather**

I got the chance to go to Southern Lehigh Intermediate School which is a local school here in Bethlehem that has the program in it. My daughter is a 6<sup>th</sup> grader there. One of the teachers invited me in with some local media to see the program. It was a wonderful experience to see the other students, and my daughter was very grateful to see that that I went to a class that wasn't hers. She dressed me appropriately for middle school, and she advised that I not go to her math class. So I went to meet another math class, and it was very good to see the students using the pawns and cubes and really getting an understanding for the program.

**Host**

So you really see enlightenment in the children's eyes, is what you are seeing?

**Heather**

I see understanding in the children's eyes. I see they are really getting it, and I think that is positioning their self esteem for greater math success.

**Host**

Now Dr. Borenson what has been your success? You've given these workshops throughout country. What do you see the growth in understanding and perception in Algebra as these workshops are given?

**Dr. Borenson**

I think that one of the biggest revelations we have is the excitement of the teacher themselves. Many of these teachers did not have a very positive experience with Mathematics and especially Algebra in school. So when they are able to solve equations, when they are able to do word problems that they now can get a visual grasp of which we also show them, you see a sense of exhilaration, and I hate to use the term but it's almost like a "religious experience" for some of them because a new world has opened up to them. Some of the people see that they gave up careers in science for no reason at all. Solving algebraic equations is really quite, quite elementary; you just have to know you're doing. But sometimes it's presented abstractly it is very difficult to know what one's doing.

**Host**

Thank you so much Dr. Borenson for helping us, giving us this revelation about what the possibilities of understanding Algebra can be using the right methods. And we're going to talk more about this amazing concept when we return to Take Charge of Your Life on WDIY.

**Advertisement for WDIY**

**Host**

Welcome back to Take Charge of Your Life. This evening we're talking about a subject that really has many parents and I'm sure children mystified as well. And that is Algebra. Tonight we're talking about Making Algebra Child's Play®, and we're talking about a concept that Dr. Henry Borenson, a former Pennsylvania math teacher designed which is called Hands-On Equations®. The company is Borenson and Associates, a parent company of Hands-On Equations®. Tonight we are going to talk with a teacher, Dale Beltzner from Southern Lehigh Intermediate School. He is a 6<sup>th</sup> Grade Math Leader and his experiences. After Dale Beltzner we are going to talk with Kathryn Dillard who is a certified national instructor. We are going to talk about their experiences and having Algebra as a revelation to their children. Dale, let's talk with you. Dale, how have you found the implementing of Making Algebra Child's Play®? How have you found that impacting the children in your class and their ability to deal with Algebra?

**Dale Beltzner**

It has had a very positive impact on my students. In the past Algebra has been very abstract much in the way that language itself can be abstract for students. They never quite saw Algebra as being a system for solving problems, which it is. They saw it as

some kind of abstract language to be learned and just symbols to be manipulated. However, once they finally have the Hands-On Equations® pieces in their hands such as the pawns and the numbers cubes and they have a balance that they are creating. Suddenly this language becomes much more real and tangible by having those pawns and those number cubes. They are able to solve problems of great complexity using pawns and number cubes in a way that they would not have, they would not have been able to do by just doing things abstractly, by manipulating symbolic symbols on a piece of paper. So it's made it much more real, and it's made it more fun because whenever students are physically engaged in moving pawns or moving number cubes you're adding in another sense, a sensory experience for them to learn. It just compliments everything else that we do.

**Host**

Now let me ask you Dale, how have the scores improved? Everybody is interested in scores. How has it improved their understanding on tests that they take?

**Dale Beltzner**

I do not have any particular data that would be like an independent study of data. However, just from what I see as a teacher, I can see that their understanding is more sophisticated when they explain processes or they show the procedures and steps of Algebra. They get the concept. They understand it more readily without as much repetition. So while it's a subjective evaluation, I do see a change; a notable change in the amount and the complexity of information that they are able to deal with at one time. Again, I don't have any scientific studies where I've sat down a side by side analysis. Many components of our math program are constantly changing. So, but from a subjective level and observation level, there certainly has been a difference.

**Host**

Do they seem to enjoy Math more from using this procedure?

**Dale Beltzner**

Oh, absolutely, absolutely! When I say to get out the Hands-On Equations® pieces, we are going to either deliberately work on a lesson or what's even more I find interesting is that when students themselves will see an appropriate time to solve a problem, and they'll reach for the Hands-On Equations® pieces and know this is a time when I can use Hands-On Equations® to help me solve a particular problem. To me that is really powerful. It's empowering the students by giving them another tool, and they definitely enjoy it. Whenever they can get to move things around and have any kind of physical action involved, they definitely enjoy it.

**Host**

Now, I think you've said a key word, and that is to say enjoy. And when I hear the word enjoy with math, you've got something very special going.

**Dale Beltzner**

Absolutely!

**Host**

And it sounds like none of the children, even the children who may not have a capacity or think of themselves as math people, they don't have a fear of it.

**Dale Beltzner**

Very true; when they see the pawns and the number cubes because they play games, they play chess, they play board games, there's something less intimidating about the math because it's something that they've already had exposure to. So that is part of the enjoyment. And also with enjoyment goes empowerment. It definitely empowers the students. It gives them a sense of control over what might be perceived as being something very abstract and which they don't have control, but they know they can manipulate these pawns and number cubes, and they know they can take more of a risk. It doesn't matter if they make a mistake and they move the wrong number cube to the wrong place. They can always move it back. So it definitely empowers them and builds their confidence at the same time providing them some enjoyment associated with math.

**Host**

Well I want to thank you so much Dale Beltzner for your input and helping us to realize that these workshops that teachers are being trained in using Making Algebra Child's Play® is really translating into enjoyment and empowerment. I love those concepts. Thanks so much Dale. I know you have to go to class so we will let you go. We are going to talk now to Kathryn Dillard. Kathryn, are you there?

**Dale Beltzner,**

Thank you so much. OK, bye now.

**Host**

Thank you. Thank you so much. Bye, bye. Kathryn, tell me you are a nationally certified instructor in Making Algebra Child's Play®. What has been your experience using this method where you are in Nashville?

**Kathryn Dillard**

Well one of the things in using Hands-On Equations® was my first introduction to it. I was an 8<sup>th</sup> grade math teacher when I first experienced it. I had a pull-out group of students who had never been successful in mathematics; meaning that their test scores placed them in a classroom which required remediation. They would be students that would never have the opportunity to take Algebra I or any high level math course at that time. Because they had never been successful or their scores did not give them the opportunity to go into those difference venues. I went to see Dr. Borenson do Hands-On Equations® and immediately said this is what my kids need. I came back. I told my children to put aside their textbooks. We're getting ready to do Algebra. They began to look at me as if to say, "She has really lost it this time; us do Algebra." The kids grabbed it. They learned how to do it. They enjoyed it. They would not allow me to stop with just one lesson. We did the entire program. I saw light bulbs come onto children's eyes that had once come into my classroom with the light bulbs completely dead. You know

these were the children that walked in and said, “I can’t do math. I don’t like math.” And for once in their lives they saw themselves as mathematicians.

### **Host**

That is exciting! That is absolutely exciting to hear that comment, that they saw themselves as mathematicians and not only enjoyed it, but that was absolutely phenomenal! Did they go on with the math? Did that help them?

### **Kathryn Dillard**

I’ll give you an example. At the end of the year my kids get to sign up for high school courses. Well these children would’ve never signed up for Algebra I or even Pre-Algebra. They would have been in a basic general math classroom. The counselor came into my classroom and all 15 of my children said, “We’re going to take Algebra next year.” I was so excited for them, but at the same time I was a little fearful. They were convinced. We can do this now Miss Dillard. We can do this. To give you an illustration of what I mean. I was a cheerleader sponsor and I’m doing a game, and I’m out of the field with 15 little girls cheering. One of my students that I had had the previous year that had never been successful, but was introduced to Hands-On Equations® was coming down the hill. He stopped right in front of me and he said, “Mrs. Dillard would you do me a favor?” I said, “What is that?” He said, “Would you close your eyes?” I said, “I can’t do that, I’ve got to watch these little girls; they’re out here cheering, and all you high school boys are all around.” He said, “Please do this for me because last year I did everything you asked me to do.” And I closed my eyes, and he said to me, “Tell me your favorite flower; just describe it for me.” I closed my eyes, and I said, “It’s a rose, it’s barely opening, it has three petals on it, and a couple thorns. There’s a little dew.” He said, “Whoa Mrs. Dillard, open your eyes”, and I opened my eyes. He said, “It’s November, there’s not a rose out here on this field. And I said, “Jason, I know that.” He said “But I want you to know that’s what you did for me last year. When you brought in Hands-On Equations® for the first time, I could close my eyes and see myself being successful with mathematics. And because of that, here’s your rose.” He handed me a red rose. From that I tell teachers all the time, go out, give your kids that support and Hands-On Equations® gives them the revelation. It gives them a sense of success. They can see the math, they can touch it, they can experience it, and then they can visualize it. You build a mental model in their hands. So when you take away the manipulatives away from the children, they’re still successful with solving algebraic linear equations because now they make sense. They see pawn, they see number cubes. In other words, they see that rose. So I say go forth, and give all your children roses.

### **Host**

Well I think that is beautiful. What a beautiful story. I wish I had had you as a teacher when I was growing up. I would have been successful; I would have been less afraid of Algebra. That is a beautiful, beautiful story. And you’ve given us a rose as well. Now the next question I have is for Heather. Heather, how do people get in touch? Are there programs for parents that might want to learn themselves? How do we, how do we get in touch with your organization?

**Heather**

Our office is based out of Allentown. We have a staff of seven. You can give us a call on our toll free number which is 800-993-6284 or you can go on our website which is [www.borenson.com](http://www.borenson.com). We do webinars every week, an introduction of Hands-On Equations®. They're free, they're 45 minutes. There's different times and different days of the week. We try to be flexible. You can register on the website for the free webinars. We also have our spring public workshop schedule on our webinar. We're doing 40 workshops this spring, nationwide. People can sign up there or if a school district is interested, again they can call the 800 number or go on the website, and we would be more than happy to send a wonderful instructor like Kathryn out to their facility.

**Host**

Well I think that is absolutely phenomenal! And there is a cost, isn't there? They're not free workshops. The webinar workshops are?

**Heather**

The webinars are free. The public workshops are \$180 for a two day workshop. It's \$95 if they opt to go for one day. A school district, it's a sliding scale depending on the material purchase.

**Host**

But it sounds like Kathryn; this would be a marvelous investment in our children's future to give them the possibility of a rose to carry through their lifetimes.

**Kathryn Dillard**

Yes it would. It definitely would.

**Host**

Well, I think that is absolutely outstanding! As I said, I wish I would have had this in my own background, but I'm so glad that this is an opportunity that is now being provided for our children now because we need them to be successful in math and science. So, thank you so much Dr. Henry Borenson, President of Borenson and Associates; Heather Harter, Media Relations Director, and also Dale Beltzner, Southern Lehigh Intermediate School 6<sup>th</sup> Grade Math Leader; and Kathryn Dillard, Certified National Instructor for helping us to take charge of our lives and making Algebra truly child's play. With the help of more workshops like those given in Nazareth recently, maybe our children will join the ranks of India and China and become more skilled in Math and Science. And maybe as Kathryn has told us, they will have a rose in their future. Thank you for helping our children and our teachers make math meaningful and perhaps give us the courage as parents to become more knowledgeable ourselves.

Host closes out Take Charge of Your Life program.

